

## Design, manufacture and testing of a galvanometer scanner

S. N. Lepeshkin, V. V. Molchanov, Yu. I. Shanin, and I. S. Sharapov

JSC "Scientific Research Institute Research and Production Association "LUCH"  
24 Zheleznodorozhnaya st., Podolsk, 142103, Russia  
E-mail: ShaninYuI@sialuch.ru

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*A galvanometric scanner (galvoscaner) is a device for turning a laser beam through a certain angle. The article considers both approaches to designing elements of a galvo scanner (a DC motor, a scanning mirror, a rotation angle sensor, a galvo scanner control driver board), and the results of testing its performance after manufacturing. The mirror and sensor were driven by a brushless DC torque motor with a rotor made of a permanent strong magnet made of neodymium, boron and iron – NdFeB. The mirrors were made of single-crystal silicon and designed for an input laser beam aperture of 15 mm. The mirrors have a reflective coating that provides a specular reflection coefficient  $R \geq 99.6\%$  for a laser wavelength  $\lambda = 1080 \pm 1$  nm. The design of an optical absolute rotation angle sensor (encoder) using LEDs and photodiodes has been developed. When developing the control board (driver) for the galvo scanner, a hybrid analog-digital architecture was used, the digital part of the driver is a digital signal processor.*

*Galvoscaners were tested for performance according to the developed program and methodology on a special stand and equipment made for testing. As a result of testing, the main design characteristics (scan angles, scan pitch, scan speed and positional repeatability, temperature zero offset and long-term drift) were exceeded.*

*Keywords:* galvanometric scanner, galvoscaner, galvo motor, deflector, scanning mirror, rotation angle sensor.

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